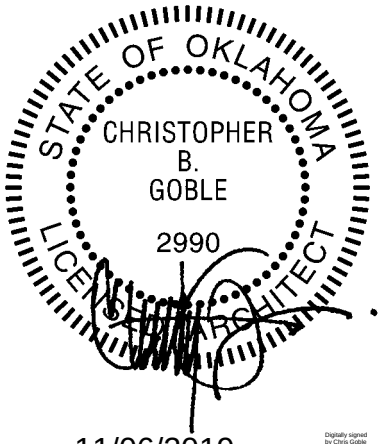
SECTION 00001

SEALS PAGE

1.1 DESIGN PROFESSIONALS OF RECORD

A. Architect:

1. Name: Christopher B. Goble, AIA
2. License #: a2990
3. Responsible for Divisions 01-13 Sections except where indicated as prepared by other design professionals of record.



11/06/2019 Digitally signed by Chris Goble Chris Goble Date: 2019.11.06 15:36:00-06'00'

Architect of Record Date

DOCUMENT 00003

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INTRODUCTORY INFORMATION

BIDDING REQUIREMENTS AND CONTRACTING REQUIREMENTS

Bidding Requirements and Contract Forms are issued by the Owner under separate cover and are not included in the Project Manual.

1

SPECIFICATIONS

DIVISION 1 - GENERAL REQUIREMENTS

DIVISION 2 – SITE CONSTRUCTION

DIVISION 3 - CONCRETE

DIVISION 4 – MASONRY - Not Used

DIVISION 5 - METALS

DIVISION 6 - WOOD AND PLASTICS

DIVISION 7 - THERMAL AND MOISTURE PROTECTION

END OF TABLE OF CONTENTS

DOCUMENT 00310

BID FORM

1

DATE: _____

Bidder, _____, a * _____ organized and existing under

the laws of the State of _____, does business as **_____.

* Insert corporation, partnership, or individual, as applicable.
** Insert trade or business name.

TO: The Board of Commissioners or Payne County
(Hereinafter called "Owner")

All:
The Bidder, in compliance with your invitation for bids for construction of : **The Yale Fire Department**, having examined the Bidding Documents prepared by SGA Design Group, P.C., and other related documents and being familiar with site of proposed Work, and with all conditions surrounding construction of proposed Project including availability of materials and labor, hereby propose to furnish all labor, materials, tools, equipment, machinery, equipment rental, transportation, superintendence, perform all Work, provide all services, and to construct all Work in accordance with Bidding Documents, within time and amounts stated herein. These amounts are to cover all expenses incurred in performing Work required under Bidding Documents, or which this Bid is a part.

Bidder, if awarded contract, hereby agrees to commence Work under this contract on or before a date to be specified in Contract Agreement or written "Notice to Proceed" from the Owner and to obtain Substantial Completion of Project within a schedule provided for each individual "bid package".

Bid Amounts shall be expressed in words and in figures. In case of discrepancy, amount shown in figures shall govern.

Upon notice of award of this Bid(s), bidder and Owner will execute Contract Agreement prior to start of Work, but not later than 10 days after Notice to Proceed.

Use of American Institute of Architects documents: A101 Standard Form of Agreement Between Owner and Contractor, 2007 edition, is hereby made a requirement of the Contract Documents.

The entire project content is available for review and coordination, however only those items identified in each individual bid are to be included in their representative bids. The Schedule of Values shall include all labor, materials, tools, equipment, machinery, equipment rental, transportation, superintendence, performance of all Work, provide all services, and to construct all Work in accordance with Bidding Documents, within time and amounts stated herein.

Bidder has received the following Addenda receipt of which is hereby acknowledged:

NUMBER:	DATE:
_____	_____
_____	_____
_____	_____

COMPLETION TIME:
The Bidder agrees to complete the performance of all Work as described in Bidding Documents within:

_____ (calendar days)

Bidder agrees to perform all Work as described in Bidding Documents, for

Lump Sum of _____ (Bidder to fill in)

($_____).

ALTERNATES

Alternate No. 1 Overhead Door Glazing	($_____)	(add)
	($_____)	(deduct)
Alternate No. 2 Electric Cord Reels	($_____)	(add)
	($_____)	(deduct)
Alternate No. 3 Domestic Water Heater	($_____)	(add)
	($_____)	(deduct)
Alternate No. 4 Metal Roof Panels	($_____)	(add)
	($_____)	(deduct)

Bid Security attached in sum of _____($_____), as required by Instructions to Bidders, becomes property of Owner in event contract agreement is not executed and Performance Bond, and Labor and Material Payment Bonds are not delivered within set forth.

If awarded a contract, Contractor shall furnish Performance Bond, and Labor and Material Payment Bond within three days following date agreement is entered into, and prior to commencement of Work. The bidder's Surety for Performance and Payment Bonds will be:_____
_____.

Bidder acknowledges receipt of following addenda:
_____.

Respectfully submitted,

Signature if an Individual: _____

Doing Business as: _____

Business Address: _____

If a Partnership: _____

By: _____ Member of Firm

_____ Member of Firm

If a Corporation _____

By: _____ Title: _____

Business Address: _____

Telephone Number: _____

END OF FORM

SECTION 00313

GEOTECHNICAL DATA

1

PART 1 GENERAL

1.01 SUMMARY

A. This Document with its referenced attachments is part of the Procurement and Contracting Requirements for Project. They provide Owner's information for Bidders' convenience and are intended to supplement rather than serve in lieu of Bidders' own investigations. They are made available for Bidders' convenience and information. This Document and its attachments are not part of the Contract Documents.

B. Because subsurface conditions indicated by the soil borings are a sampling in relation to the entire construction area, and for other reasons, the Owner, the Architect, the Architect's consultants, and the firm reporting the subsurface conditions do not warranty the conditions below the depths of the borings or that the strata logged from the borings are necessarily typical of the entire site. Any party using the information described in the soil borings and geotechnical report shall accept full responsibility for its use.

C. A geotechnical investigation report for Yale Fire Department, prepared by GFAC Engineering, Inc, dated 6/27/2017 is provided as appended to this Document.

   a. The opinions expressed in this report are those of a geotechnical engineer and represent interpretations of subsoil conditions, tests, and results of analyses conducted by a geotechnical engineer. Owner is not responsible for interpretations or conclusions drawn from the data.

   b. Any party using information described in the geotechnical report shall make additional test borings and conduct other exploratory operations that may be required to determine the character of subsurface materials that may be encountered.

END OF SECTION

GEOTECHNICAL ENGINEERING REPORT
PROPOSED YALE FIRE STATION
SEC OF N. "H" STREET AND E. DETROIT AVENUE
YALE, OKLAHOMA

PROJECT NO. G2017040

June 27, 2017

8157 E. 46th Street, Tulsa, Oklahoma 74145 **p:** 918.622.7021

June 27, 2017
Project No.: G2017040

Mr. Joe Kelley, P.E.
JC Engineering, PC
10035 N. 177th East Avenue
Owasso, Oklahoma 74055-7841

Subject: **Geotechnical Engineering Report**
Proposed Yale Fire Station
SEC of North "H" Street and East Detroit Avenue
Yale, Oklahoma

Dear Mr. Kelley:

GFAC Engineering Inc. has completed the authorized geotechnical engineering evaluation for the above-referenced project. The purpose of the geotechnical study was to explore and evaluate the subsurface conditions at various locations on the site and develop geotechnical design and construction recommendations for the project. The attached GFAC Engineering Inc. report contains a description of the findings of our field exploration and laboratory testing program, our engineering interpretation of the results with respect to the project characteristics, and our geotechnical site development and foundation design recommendations as well as construction guidelines for the planned project.

Recommendations provided herein are contingent on the provisions outlined in the ADDITIONAL SERVICES and LIMITATIONS sections of this report. The project Owner should become familiar with these provisions in order to assess further involvement by GFAC Engineering Inc. and other potential impacts to the proposed project.

We appreciate the opportunity to be of service and are prepared to provide the recommended additional services. Please call us if you have any questions concerning this report.

Respectfully submitted,
GFAC ENGINEERING INC.
Certificate of Authorization #6389, Exp. 6/30/2018

REGISTERED PROFESSIONAL ENGINEER
DALE L. KELLEY II
27 June 2017
21521
OKLAHOMA

Dale L. Kelley II, P.E.
Oklahoma: 21521

Brian K. Marick, P.E.
Principal Engineer

8157 E. 46th Street, Tulsa, Oklahoma 74145

p: 918.622.7021

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APPENDIX A

Field Exploration Program
Plate 1 – Site Location Map
Plate 2 – Boring Location Diagram
Subsurface Diagram
Boring Logs

APPENDIX B

Laboratory Testing Program

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GEOTECHNICAL ENGINEERING REPORT
PROPOSED YALE FIRE STATION
SEC OF NORTH "H" STREET AND EAST DETROIT AVENUE
YALE, OKLAHOMA
GFAC ENGINEERING INC. PROJECT NO. G2017040
EXECUTIVE SUMMARY

Site:

- The project site is located on the southeast corner of the intersection of North "H" Street and East Detroit Avenue in Yale, Oklahoma. The site is bordered by North "H" Street on the west, East Detroit Avenue on the north, State Highway 51 on the south, and by a grass and tree covered lot and a church on the east. The site was previously occupied by a single story senior living center/nursing home facility.
- The ground surface at the project site is a combination of exposed soil, an asphaltic concrete parking lot, grass, and gravel. The area of the site that was exposed soil was the footprint of the previously existing senior living center/nursing home facility. Several trees were also noted at the project site. It appears that fill materials may have been placed in the eastern portion of the site.
- Proofrolling of the exposed subgrade is required to detect soft, unstable, or undesirable material and proper compaction of fill and correction of soft unstable areas is required to create support for structural elements.
- Based on the conditions encountered in the borings and the results of the laboratory testing, the on-site soil and bedrock materials, minus any organic matter or other deleterious materials, with a PI of 22 or less would be suitable for use as "non-expansive" select fill within the building pad. Materials with a PI greater that 22 are NOT suitable for use as "non-expansive" select fill within the building pad.
- The on-site soil and bedrock materials, minus any organic material or other deleterious materials, is suitable for use as structural fill outside of the building footprint area.
- The on-site soils, minus any organic materials, are suitable for use as structural fill outside of the building footprint area.
- The subsurface conditions encountered across the entire site are favorable for the development of perched groundwater conditions. In a "perched' groundwater condition, precipitation will infiltrate the upper lower plasticity more permeable soils and sit (perch) on the underlying less permeable bedrock.
- A grading plan was not available at the time this proposal was prepared. It has been assumed that minimal earthwork, i.e. maximum cuts and fills on the order of 2 feet, will be required at the site to achieve finish grades.

8157 E. 46th Street, Tulsa, Oklahoma 74145 **p:** 918.622.7021

Building:

- The building pad should be undercut to a level of 18 inches below existing grade or 12 inches below the finish subgrade level, whichever extends to a lower elevation.
- Any existing fill present within the building footprint area shall be undercut full depth and replaced with structural fill.
- Lower consistency soils should be anticipated at the undercut depth in portions of the site. Removal and replacement of lower consistency soils is required to provide adequate and uniform support for the proposed building and a subgrade suitable for fill placement.
- The site is suitable for support of the building on a shallow foundation system bearing in "non-expansive" select fill, suitable native soils, or sandstone and shale bedrock.
- The shallow foundation system for the proposed building bearing in "non-expansive" select fill, suitable native soils, or sandstone and shale bedrock can be proportioned based upon a maximum allowable bearing pressure of 2,000 psf.
- Provided all of the foundations are extended into the underlying sandstone and shale bedrock, the shallow foundations can be proportioned based upon a maximum allowable bearing pressure of 3,500 psf.
- All fill placed within the building pad should consist of "non-expansive" select fill material.
- Undercutting and placement of "non-expansive" select fill should extend a minimum of 5 feet beyond the perimeter of the building.

Pavements:

- Anticipated axle loads for the new fire truck were provided. It is our understanding that the new fire truck will have an approximate front axle load of 14,600 pounds and a tandem rear axle load of 44,000 pounds.
- The number of trips, vehicle type, and axle loading information for all of the emergency response vehicles that will utilize this facility has not been provided. Based upon our experience with similar facilities, it has been assumed that the proposed facility will be subjected to an equivalent of approximately 350,000 18-kip Equivalent Single Axle Loads (ESAL's) over a period of 20 years.
- Typical pavement sections are provided for passenger vehicle parking.
- Existing fill materials present within the proposed pavement areas should be evaluated through the use of proofrolling and test pits.
- Lower consistency soils were encountered at the site in a portion of the borings. Removal and replacement of these lower consistency soils is required to provide adequate and uniform support for the proposed pavements and a subgrade suitable for fill placement.
- The pavement subgrade is anticipated to consist of native soils, newly placed structural fill, evaluated and approved existing fill, or sandstone and shale bedrock.

- The pavement subgrade shall be scarified, moisture conditioned and recompacted to a minimum depth of 8 inches.
- A minimum of 6 inches of aggregate base material, such as ODOT Aggregate Base Type “A”, should be placed below the pavement.
- Where relatively unweathered bedrock is exposed at the finish subgrade elevation, the bedrock shall be undercut to allow placement of a minimum of 6 inches of dense graded aggregate base (ODOT Type A) below the pavement.

The information stated above is a brief summary of the recommendations presented within this report. The report should be reviewed in its entirety for proper implementation of the recommendations.

GEOTECHNICAL ENGINEERING REPORT
PROPOSED YALE FIRE STATION
SEC OF NORTH "H" STREET AND EAST DETROIT AVENUE
YALE, OKLAHOMA

1. INTRODUCTION

1.1 GENERAL

GFAC Engineering Inc. has completed the authorized geotechnical engineering evaluation for the Proposed Yale Fire Station located on the southeast corner of the intersection of North "H" Street and East Detroit Avenue in Yale, Oklahoma. This report includes our recommendations related to the geotechnical aspects of the project design and construction. Conclusions and recommendations presented in the report are based on the subsurface information encountered at the location of our exploration and the provisions and requirements outlined in the ADDITIONAL SERVICES and LIMITATIONS sections of this report.

1.2 PROPOSED CONSTRUCTION

We understand the Yale Fire Department will be constructing a new Fire Station will be located on the southeast corner of the intersection of North "H" Street and East Detroit Avenue in Yale, Oklahoma. We understand that the building will be a single story metal building with approximate dimensions of 160 feet by 72 feet. A total of 5 bays along with office space, restrooms, a training area, a workout room and storage areas are planned for the interior of the structure. The proposed building is anticipated to be constructed with a wood or light gauge metal frame, a metal panel exterior, a metal roof, and a slab-on-grade floor system.

No loading information was available at the time this report was prepared. It has been assumed that maximum column loads will be on the order of 50 kips, maximum wall loads will be less the 3 kips per linear foot, and maximum floor loads will be less than 150 pounds per square foot (psf).

A grading plan was not available at the time this report was prepared. It has been assumed that minimal earthwork, i.e. maximum cuts and fills on the order of 2 feet, will be required at the site to achieve finish grades.

Pavements will be constructed on the north and south sides of the proposed building area. Passenger vehicle/light duty parking is anticipated to be constructed to the north of the proposed building. Typical pavement sections were provided for passenger vehicle parking. It is anticipated that with the exception of the light duty parking area, the pavements will be subjected primarily to fire trucks.

With the exception of the axle loads for the new fire truck, traffic data was not provided. It is our understanding that the new fire truck will have an approximate front axle load of 14,600 pounds and a tandem rear axle load of 44,000 pounds. The number of trips, vehicle type, and axle loading information for all of the emergency response vehicles that will utilize this facility has not been provided. Based upon our experience with similar facilities, it has been assumed that the proposed facility will be subjected to an equivalent of approximately 350,000 18-kip Equivalent Single Axle Loads (ESAL's) over a period of 20 years. If additional traffic information becomes available, it should be provided to GFAC Engineering to determine if modification of the recommendations included in this report would be warranted.

Recommendations related to the design of retention/detention basins, retaining walls, and below grade structures are beyond the scope of services for this study.

The scope of the engineering evaluation for this study, as well as the conclusions and recommendations in this report, were based on our understanding of the project as described above. If pertinent details of the project have changed or otherwise differ from our descriptions, we must be notified and engaged to review the changes and modify our recommendations, if needed.

2. SITE CONDITIONS

2.1 SITE DESCRIPTION

We understand the Yale Fire Station facility will be constructed on the southeast corner of the intersection of North “H” Street and East Detroit Avenue in Yale, Oklahoma. The proposed project location is indicated on Plate 1 included in APPENDIX A. The site is bordered by North “H” Street on the west, East Detroit Avenue on the north, State Highway 51 on the south, and by a grass and tree covered lot and a church on the east. The site was previously occupied by a single story senior living center/nursing home facility.

The ground surface at the project site is a combination of exposed soil, an asphaltic concrete parking lot, grass, and gravel. The area of the site that was exposed soil was the footprint of the previously existing senior living center/nursing home facility. Several trees were also noted at the project site. It appears that fill materials may have been placed in the eastern portion of the site. The majority of the site is relatively level, however, the eastern portion of the site slopes downward towards the east into a low area. An elevation differential of approximately 1 foot was noted between the boring locations across the site.

Existing utilities in the vicinity of the site include, but most likely are not limited to, water lines, gas lines, communications lines, and overhead electric lines. Additional utilities may be present in the vicinity of the site.

2.2 SUBSURFACE CONDITIONS

The following presents a general summary of the major strata encountered at the project site during our subsurface exploration. Specific subsurface conditions encountered at the boring locations are presented on the respective logs in APPENDIX A. The stratification lines shown on the logs and section represent the approximate boundaries between material types; in situ, the transitions may vary or be gradual.

Surficial Materials: A 2-inch thick layer of asphaltic concrete underlain by a 5-inch thick layer of clayey gravel was encountered at the ground surface at the location of Boring B-1. A 6-inch thick layer of topsoil mixed with limestone gravel was encountered at the ground surface at the location of Boring B-2. A 3 to 4-inch thick layer of topsoil was encountered at the ground surface at the location of Boring P-2. Exposed soil was noted at the ground surface at the locations of B-3 and P-1.

Existing/Possible Fill: Existing/Possible Fill consisting of sandy lean clay was encountered at the ground surface at the location of Boring P-1 and below the topsoil at the location of Boring P-2 and continued to approximate depths of 0.8 and 2.2 feet in Borings P-1 and P-2, respectively. A sandstone boulder which may have been fill material was encountered between the approximate depths of 2.2 and 3 feet in Boring P-2.

Native Soils: Native soils were encountered below the pavement materials in Boring B-1, below the topsoil and limestone gravel in Boring B-2, and at the ground surface at the location of Boring B-3 and continued to approximate depths ranging from 1.7 to 3.2 feet. The native soils consisted of lean clay with varying sand content. Native soils were not encountered in Borings P-1 and P-2.

Bedrock: Sandstone and shale bedrock was encountered below the fill materials and the native soils at approximate depths ranging from 0.8 to 3.2 feet and continued to the bottom of the borings at approximate depths ranging from 5 to 9.3 feet. The upper portion of the bedrock unit appeared to be highly weathered or weathered. The hardness of the bedrock increased with increasing depth.

2.3 GENERAL SITE GEOLOGY

According to the "Engineering Classification of Geologic Materials – Division Four" from the Oklahoma Highway Department, 1967, the project site appears to be located within an area described as the Vanoss-Ada Unit (Pva).

Vanoss-Ada Unit (Pva): This unit consists dominantly of shale with a lesser amount of limestone and sandstone. Two limestones are described separately in this chapter as

subunits, the Brownville and Wakarusa. These subunits are good “marker beds”. The shales are dominantly gray below the Wakarusa subunit but are red to gray above the subunit.

The limestones not described as subunits are light gray, buff to light red, and are generally thin-bedded, less than two feet thick. In section 12, T18N, R5E, and section 10, T18N, R6E, Payne County, the limestones thicken locally to about eight feet. The limestone generally thin southward. The sandstones range from yellow to red, moderately soft to moderately hard, thin-bedded to massive, and range from thin lenses to massive beds up to 20 feet thick. The sandstones generally thicken southward. The Vanoss-Ada unit ranges from 400 to 500 feet thick in Division Four.

The unit outcrops in a north-south 10 mile wide band across western Creek, and eastern Payne, and Lincoln Counties of Division Four. Topographically, the unit is rolling. Limestone and sandstones generally cap hills with shales underlying the valleys.

2.4 GROUNDWATER OBSERVATIONS

Groundwater observations were made both during and after completion of drilling operations. The borings remained dry both during and immediately following the drilling operations. Extended water level readings were not obtained.

The materials encountered in the borings have a wide range of hydraulic conductivity and observations over an extended period of time may show the presence of groundwater. Use of piezometers would be required to better define current groundwater conditions and groundwater level fluctuations with time. Fluctuations of groundwater levels can occur due to seasonal variations in the amount of rainfall, runoff, and other factors not evident at the time the borings were performed. The possibility of groundwater level fluctuations should be considered when developing the design and construction plans for the project.

The subsurface conditions encountered across the entire site are favorable for the development of perched groundwater conditions. In a “perched’ groundwater

condition, precipitation will infiltrate the upper lower plasticity/non plastic more permeable soils and sit (perch) on the underlying less permeable higher plasticity clay soils or bedrock. Generally, perched water is of limited volume and can be controlled with typical dewatering methods. During wet seasons, the perched groundwater can cause the upper layers of soils to become soft and unstable.

3. ANALYSIS AND DISCUSSION

3.1 GENERAL

Based on the results of our evaluation, it is our professional opinion that the proposed project site could be developed for the proposed building using conventional grading and foundation construction techniques.

3.2 SITE DEVELOPMENT

3.2.1 Demolition

Site development should commence with the demolition of the existing pavements, sidewalks, and any other structures located within the proposed construction area. All debris resulting from the demolition process should be removed from the site. Areas disturbed during demolition shall be thoroughly evaluated by the geotechnical engineer prior to placement of structural fill. All disturbed soils shall be undercut prior to placement of structural fill. Structural fill shall be placed in the excavations created by the demolition/removal process in accordance with the recommendations presented in Section 4.3 of this report. Use of construction debris as fill material shall not be allowed.

3.2.2 Stripping and Grubbing

Site development should include the stripping of any vegetation, organic soils, and associated root systems from planned construction areas. Any required tree removal should also be accomplished at this time. Care shall be taken to thoroughly remove all root systems from the construction areas. Materials disturbed during stripping operations should be stabilized in place or undercut and replaced with structural fill.

3.2.3 Existing/Possible Fill

Existing/Possible Fill consisting of sandy lean clay was encountered at the ground surface at the location of Boring P-1 and below the topsoil at the location of Boring P-2

and continued to approximate depths of 0.8 and 2.2 feet in Borings P-1 and P-2, respectively. A sandstone boulder which may have been fill material was encountered between the approximate depths of 2.2 and 3 feet in Boring P-2.

Unsuitable existing fill material, i.e. organics, construction debris, boulders, etc. encountered during mass grading should be undercut full depth and be replaced with structural fill.

Depth of fill across the site is anticipated to vary from that encountered within our borings. Existing fill materials removed from the proposed building footprint should be undercut and be replaced with "non-expansive" select fill. Existing fill materials removed from the proposed pavement areas should be evaluated through the use of proofrolling. Unstable areas encountered during proofrolling can be further evaluated through the use of test pits.

Test pits could be excavated at the site to further delineate areas and depth of existing fill.

3.2.4 Existing Utility Trenches and Proposed Utilities

Existing utilities encountered during construction within the zone of influence of proposed construction areas should be relocated/abandoned as part of the site development. All existing utility lines within the proposed building addition footprint should be relocated to areas outside of the proposed construction. Excavations created by removal of the existing lines should be cut wide enough to allow for the use of heavy construction equipment to compact backfill. If the lines are to be left in place, thorough evaluation of the backfill will be required.

All underground utility lines for the proposed project should be located outside the zone of influence of proposed foundations; that is a zone extending from the bottom edge of the footing at a slope of 1 Horizontal to 1 Vertical, 1(H):1(V). If utility lines are within the

zone of influence of the foundations, settlements in excess of those presented in this report may occur.

3.2.5 Scarification, Moisture Conditioning and Compaction

Following any required undercutting (see Section 3.5), the exposed subgrade should be scarified, moisture conditioned, and recompacted in preparation for fill placement. Extremely wet or unstable areas that hamper compaction of the subgrade may require undercutting and replacement with structural fill or discing and aeration may be required to lower moisture contents to levels that will allow proper compaction of the exposed grade.

Scarification, moisture conditioning, and recompaction of the unweathered bedrock would not be required.

3.2.6 Proofrolling

Following moisture conditioning and prior to placement of structural fill, the exposed grade should be proofrolled. Proofrolling of the subgrade aids in identifying soft (lower consistency/loose) or disturbed areas. Unsuitable areas identified by the proofrolling operation should be: 1) undercut and replaced with structural fill, 2) scarified, aerated, and recompacted, 3) stabilized in place with shot/crushed rock with a maximum diameter of 6 inches, or 4) spanned through the use of bi-axial geogrid, depending upon the nature/location of the unstable/disturbed area. The actual method of stabilization would depend upon the area that is to be stabilized (i.e.; building pad, pavements, etc.). Proofrolling can be accomplished through use of a fully-loaded, tandem-axle dump truck or similar equipment providing an equivalent subgrade loading.

Proofrolling of any unweathered bedrock that may be exposed would not be required.

3.2.7 Perched Groundwater

The site is favorable for development of “perched” groundwater in the near surface soils above the bedrock. Depending upon the amount of precipitation that falls prior to and during the construction of the proposed facility, a perched groundwater condition may develop. Depending upon the amount of perched groundwater present, the near surface soils could become soft and unstable with repetitive construction traffic. Typically, “perched” groundwater can be controlled with typical dewatering methods.

3.3 EXCAVATIONS

3.3.1 General

All excavations must comply with applicable local, state and federal safety regulations. ***The responsibility for excavation safety and stability of temporary construction slopes lies solely with the contractor.*** We are providing this information below solely as a service to our client. Under no circumstances should this information provided be interpreted to mean that GFAC Engineering Inc. is assuming responsibility for construction site safety or the contractors activities, such responsibility is not being implied and should not be inferred.

3.3.2 Foundation and Utility Excavations

It is anticipated that excavations for the proposed structure and shallow utilities will generally be in existing/possible fill, newly placed structural fill and native soils above the groundwater level. Excavations within these materials should be possible with conventional excavation equipment. Deeper excavations will likely extend into the sandstone and shale bedrock. The soil materials and the highly weathered to weathered bedrock with a Standard Penetration Resistance (N) value of less than 25 blows per foot can generally be excavated with conventional heavy equipment such as backhoes, scrapers, loaders, etc. Excavation of harder, less weathered sandstone and shale bedrock will most likely be difficult and will likely require the use of single-tooth rippers mounted on large tractors such as a Caterpillar D-8 or larger, rock buckets

mounted on backhoes/trackhoes, or other rock excavating techniques to complete the excavations. **Excavation of the sandstone and shale bedrock may require the use of pneumatic breakers attached to a trackhoe**. Excavation of these materials in confined excavations may be difficult.

3.3.3 Excavation Slopes and Construction Considerations

Excavations should be cut to a stable slope or be temporarily braced, depending upon the excavation depths and the subsurface conditions encountered. ***Temporary construction slopes should be designed in strict compliance with the most recent governing regulations.*** Stockpiles should be placed well away from the edge of the excavation and their heights should be controlled so they do not surcharge the sides of the excavation. Surface drainage should be carefully controlled to prevent flow of water into the excavations. Construction slopes should be closely observed for signs of mass movement: tension cracks near the crest, bulging at the toe, etc. If potential stability problems are observed, a geotechnical engineer should be immediately contacted.

3.4 STRUCTURAL FILL

Based on the conditions encountered in the borings and the results of the laboratory testing, the on-site soil and bedrock materials, minus any organic matter or other deleterious materials, with a PI of 22 or less would be suitable for use as “non-expansive” select fill within the building pad. Materials with a PI greater that 22 are NOT suitable for use as “non-expansive” select fill within the building pad. The on-site soil and bedrock materials, minus any organic material or other deleterious materials, is suitable for use as structural fill outside of the building footprint area. Additional testing and observation at the time of construction is recommended to further evaluate these materials prior to use as structural fill. All imported material shall meet the requirements as outlined in Section 4.3.

3.5 BUILDING PAD PREPARATION

A grading plan was not available at the time this proposal was prepared. It has been assumed that minimal earthwork, i.e. maximum cuts and fills on the order of 2 feet, will be required at the site to achieve finish grades.

The building pad should be undercut to a level of 18 inches below existing grade or 12 inches below the finish subgrade level, whichever extends to a lower elevation. Existing fill present within the proposed building footprint shall be undercut full depth and be replaced with “non-expansive” select fill. All fill placed within the building footprint shall consist of “non-expansive” select fill.

Lower consistency soils should be anticipated at the undercut depth in portions of the site. Removal and replacement of lower consistency encountered within the building footprint is required to provide adequate and uniform support for the proposed structure and pavements, and also subgrade suitable for fill placement.

The active zone at the project site is on the order of 1 to 3 feet based on the depth of rock. The calculated PVR within the building is anticipated to be less than 1 inch based upon existing grades, anticipated final grades, and provided the recommendations in this report are implemented.

A shallow grade supported foundation system may be considered at this site provided the recommendations provided in this report are implemented.

3.6 FOUNDATIONS

Provided the recommendations presented in this report are implemented, the subsurface conditions at the site are suitable for support of the proposed structure on a shallow foundation system founded in “non-expansive” select fill, suitable native soils, or sandstone and shale bedrock. The allowable bearing pressure presented in Section 4.4 has been reduced to limit the amount of differential settlement due to the possibility of variable bearing material and variable depth to bedrock.

3.7 SETTLEMENTS

It is anticipated that shallow foundations will be founded in “non-expansive” select fill, suitable native soils, or sandstone and shale bedrock. Settlement of the building foundations has been estimated to be 1 inch or less. Differential settlements are anticipated to be approximately 1/2 to 3/4 of total settlement. These estimates are based on the recommendations presented in this report being implemented. It is anticipated that as much as ¾ inch of differential movement may occur between foundations bearing on bedrock and those bearing on soils. If differential settlements of this magnitude are not acceptable, deepening of the foundations to bear on the bedrock may be required.

3.8 CONCRETE SLABS SUPPORTED ON-GRADE

Recommendations outlined in Sections 4.2 and 4.3 of this report are intended to develop subgrades that are suitable for support of the building floor slabs. These recommendations include that all material imported to the project site meet the requirements outlined in Section 4.3. It is recommended that the building pad be undercut to a level of 18 inches below existing grade or 12 inches below the finish subgrade level, whichever extends to a lower elevation. If the building pad is constructed as recommended, potential vertical movement of the slab on grade is anticipated to be less than 1 inch.

Subsurface moisture and moisture vapor naturally migrate upward through the soil and, where the soil is covered by a building, this subsurface moisture will collect. To reduce the impact of this subsurface moisture and the potential impact of future induced moisture (such as landscape irrigation or precipitation) a vapor retarder is sometimes utilized below the compacted crushed limestone layer. This membrane typically consists of visquene or polyvinyl plastic sheeting. It should be noted that although vapor retarder systems are frequently utilized, this system may not be completely effective in preventing floor slab moisture problems. These systems will not necessarily assure that floor slab moisture transmission rates will meet floor covering manufacturer

standards and that indoor humidity levels will be appropriate to inhibit mold growth. The design and construction of such systems are totally dependent on the proposed use and design of the proposed building and all elements of building design and function should be considered in the slab-on-grade floor design. Building design and construction may have a greater role in perceived moisture problems since sealed buildings/rooms or inadequate ventilation may produce excessive moisture in a building and affect indoor air quality.

Various factors such as surface grades, adjacent planters, the quality of slab concrete and the permeability of the on-site soils affect slab moisture and can influence future floor and moisture conditions. In many cases, floor moisture problems are the result of either improper curing of floor slabs or improper application of floor adhesives. We recommend contacting a flooring consultant experienced in the area of concrete slab-on-grade floors or the floor covering manufacturer for specific recommendations regarding your proposed flooring applications.

Special precautions must be taken during the placement and curing of all concrete slabs. Excessive slump (high water-cement ratio) of the concrete and/or improper curing procedures used during either hot or cold weather conditions could lead to excessive shrinkage, cracking or curling of the slabs. High water-cement ratio and/or improper curing also greatly increase the water vapor permeability of the concrete. We recommend that all concrete placement and curing operations be performed in accordance with the American Concrete Institute (ACI) Manual.

3.9 CLIMATIC CONDITIONS AND CONSTRUCTION CONSIDERATION

Weather conditions will influence the site preparation required. In spring and late fall, following periods of rainfall, the moisture content of the near-surface soils may be significantly above the optimum moisture content. Excessive moisture could seriously impede grading by causing an unstable subgrade condition. Typical remedial measures include aerating the wet subgrade, removal of the wet materials and replacing them with

dry materials, reinforcing the subgrade with geotextiles/geogrid or applying lime, cement kiln dust (CKD), or Class “C” fly ash as a drying agent.

If construction of the project is to be performed during winter months, appropriate steps should be taken to prevent the soils from freezing. In no case should the fill, foundations, or other flat work be placed on or against frozen or partially frozen materials. Frozen materials shall be removed and replaced with a suitable material. Frozen materials shall not be included in any compacted fills.

3.10 PAVEMENTS AND PAVEMENT SUBGRADE PREPARATION

Pavements will be constructed on the north and south sides of the proposed building area. Passenger vehicle/light duty parking is anticipated to be constructed to the north of the proposed building. Typical pavement sections were provided for passenger vehicle parking. It is anticipated that with the exception of the light duty parking area, the pavements will be subjected primarily to fire trucks.

With the exception of the axle loads for the new fire truck, traffic data was not provided. The number of trips, vehicle type, and axle loading information for all of the emergency response vehicles that will utilize this facility has not been provided. Based upon our experience with similar facilities, it has been assumed that the proposed facility will be subjected to an equivalent of approximately 350,000 18-kip Equivalent Single Axle Loads (ESAL’s) over a period of 20 years.

The pavement subgrade should be prepared in accordance with Sections 4.2 and 4.3 of this report which are intended to develop subgrades that are suitable for pavements. These recommendations include that all material imported to the project site meet the requirements outlined in Section 4.3.

We anticipate that the pavement subgrade will consist of native soils, evaluated and approved existing fill, newly placed structural fill, and possibly sandstone and shale bedrock. In areas that are to receive fill and/or where soils are exposed at the

pavement subgrade level, the exposed soils should be scarified, moisture conditioned, and recompacted to a minimum depth of 8 inches.

Where relatively unweathered bedrock is exposed at the finish subgrade elevation, the bedrock shall be undercut to allow placement of a minimum of 6 inches of dense graded aggregate base (ODOT Type A) below the pavement. Undercutting of the relatively unweathered bedrock is recommended to provide uniform support below the pavement in cut and fill areas. Support of the new pavements directly on the underlying bedrock is not recommended.

Lower consistency soils were encountered at the site in a portion of the borings. Removal and replacement of these lower consistency soils is required to provide adequate and uniform support for the proposed pavements and a subgrade suitable for fill placement.

The pavement subgrade should be sloped to provide rapid drainage. This includes the underlying subgrade soils since the granular base material readily transmits water. The granular section should be graded to pipe underdrains, adjacent storm sewer inlets, or drainage ditches to provide drainage from the granular section. Water allowed to pond on or adjacent to the pavement could saturate the subgrade and cause premature pavement deterioration.

Disturbance, desiccation, and/or wetting of the subgrade between grading and paving can result in deterioration of the previously completed subgrade. A non-uniform subgrade can result in poor pavement performance and local failures relatively soon after pavements are constructed.

We recommend that the pavement subgrades be proofrolled and the moisture content and density of the top 12 inches of subgrade be checked within two days prior to commencement of actual paving operations. If any significant event, such as precipitation, occurs after proofrolling, the subgrade should be reviewed by qualified

geotechnical engineering personnel immediately prior to placing the pavement. The subgrade should be in its finished form at the time of the final review.

3.11 LANDSCAPING AND SITE GRADING CONSIDERATIONS

Provisions should be made to reduce the potential for large moisture changes within building subgrade soils located adjacent to landscape areas, to reduce the potential for subgrade movement. Positive drainage away from the building should be incorporated into the design plans. Ponding of water adjacent to the building could contribute to significant moisture increases in the subgrade soils and subsequent heaving.

Consideration should also be given to limiting landscaping and irrigation adjacent to the building. Trees and large bushes can develop intricate root systems that can draw moisture from the subgrade soils, causing them to shrink during dry periods of the year. Desiccation of soils below foundations can result in settlement of shallow foundations.

4. RECOMMENDATIONS

4.1 GENERAL

Based on the results of our evaluation, it is our professional opinion that the proposed project site could be developed for the proposed building using conventional grading and foundation construction techniques. Recommendations regarding geotechnical aspects of the project design and construction are presented below.

The recommendations submitted herein are based, in part, upon data obtained from our subsurface exploration. The nature and extent of subsurface variations that may exist at the proposed project site will not become evident until construction. If variations appear evident, then the recommendations presented in this report should be evaluated. In the event that any changes in the nature, design, location or depth of the proposed structure are planned, the conclusions and recommendations contained in this report will not be considered valid unless the changes are reviewed and our recommendations modified in writing.

4.2 SITE PREPARATION

We recommend the following for site preparation:

1. Demolition should include the removal of the existing pavements, sidewalks, and any other structures located within the proposed construction area. All debris resulting from the demolition process shall be removed from the site. All disturbed soils shall be undercut prior to placement of structural fill.

2. All vegetation and topsoil shall be stripped from the site. Any required tree removal should also be completed at this time. Care shall be taken to thoroughly remove all root systems.

3. The proposed building footprint area should be undercut to a level of 18 inches below existing grade or 12 inches below the finish subgrade level, whichever extends to a lower elevation.

4. Existing fill present within the proposed building footprint shall be undercut full depth and be replaced with “non-expansive” select fill.

5. Existing fill present within the proposed pavement areas should be evaluated through the use of proofrolling and test pits. Unsuitable materials encountered during the proofrolling and/or test pits should be undercut and be replaced with controlled structural fill.

6. If not removed during the recommended undercutting operation, all lower consistency/soft/unstable soils encountered within the building footprint should be undercut full depth and replaced with structural fill.

7. All fill placed within the proposed building footprint area should consist of “non-expansive” select fill.

8. Undercutting and placement of “non-expansive” select fill should extend a minimum of 5 feet beyond the building footprint area.

9. When encountered, the fill thickness within the borings ranged from 0.8 to 3 feet.

10. Following stripping and required undercutting operations, the exposed subgrade should be scarified, moisture conditioned, and recompacted to a minimum depth of 8 inches.

11. The exposed subgrade should be proofrolled with a fully loaded, tandem-axle dump truck. Proofrolling of the unweathered bedrock would not be required. Unsuitable areas identified by the proofrolling operation should be: 1) undercut and replaced with structural fill, 2) scarified, aerated, and recompacted, 3)

stabilized in place with shot/crushed rock with a maximum diameter of 6 inches, or 4) spanned through the use of bi-axial geogrid, depending upon the nature/location of the soft areas. The method in which unsuitable areas are corrected would depend upon the location of the unsuitable areas and the conditions encountered at the site at the time of construction.

12. Where bedrock is exposed at the finish subgrade elevation in the pavement areas, the bedrock should be undercut to allow placement of a minimum of 6 inches of dense graded aggregate base (ODOT Type A) below the pavements.

4.3 STRUCTURAL FILL

We recommend the following for structural fill:

1. **BUILDING PAD** - All fill placed within the building footprint should consist of a "non-expansive" structural fill material with the following properties:

    a. Maximum Liquid Limit of 45 and a maximum Plasticity Index (PI) of 22.

    b. "Non-expansive" select fill material shall consist of approved materials, free of organic matter (organic content less than 4 percent) and debris. Approved materials are defined as those soils classified by ASTM D 2487 as CL, GC, SC, and SP.

2. **ON-SITE SOILS** – The on-site soil and bedrock materials, minus any organic matter or other deleterious materials, with a PI of 22 or less would be suitable for use as "non-expansive" select fill within the building pad. Materials with a PI greater that 22 are NOT suitable for use as "non-expansive" select fill within the building pad. The on-site soil and bedrock materials, minus any organic material or other deleterious materials, is suitable for use as structural fill outside of the building footprint area. Additional testing and observation at the time of

construction is recommended to further evaluate these materials prior to use as structural fill.

3. **OTHER IMPORTED MATERIAL** – We recommend the following criteria for imported materials to be used outside of the building area:

    a. The material should consist of approved materials, free of organic matter (organic content less than 4 percent) and debris. Approved materials are defined as those soils classified by ASTM D 2487 as CL, GC, SC, and SP.

    b. A maximum Liquid Limit of 50 and a maximum Plasticity Index (PI) of less than 30.

4. All fill material should have a maximum particle size of 3 inches.

5. All fill should be placed in lifts having a maximum loose lift thickness of 9 inches.

6. All fill shall be compacted to a minimum of 95 percent of the material's maximum dry density as determined by ASTM D 698, standard Proctor compaction.

7. The moisture content of the clay fill (Plasticity Index > 10) at the time of compaction should be within a range of 0 to 4 percent above optimum moisture content as defined by the standard Proctor compaction procedure.

8. For clay fills having lower plasticities (Plasticity Index < 10) and sand, it may be necessary to use a moisture range of 2 percent below to 2 percent above optimum moisture content.

4.4 FOUNDATIONS

Following the recommended site preparation, the building foundations would be supported on non-expansive" select fill, suitable native soils, or sandstone and shale bedrock. We recommend the following design criteria:

1. Building footings may be proportioned for a maximum allowable bearing pressure presented in the following table. A higher maximum allowable bearing pressure can be utilized if all of the footings for the structure are extended into the underlying sandstone and shale bedrock. The allowable bearing pressure is based on a minimum factor of safety of approximately three (3) with respect to shear failure of the foundation bearing materials.

Table 4.4 – Allowable Bearing Pressure

Bearing Material	Allowable Bearing Pressure (psf)	Estimated Settlement (inches)
"Non-Expansive" Select Fill, Suitable Native Soils, Sandstone and Shale Bedrock	2,000	Less than 1
Sandstone and Shale Bedrock	3,500	Less than 1

2. Continuous wall footings should have a minimum width of 16 inches and isolated spread footings should have a minimum width of 24 inches.

3. The frost depth at the project site is approximately 22 inches.

4. The foundations should extend a minimum of 24 inches below exterior grades due to freeze/thaw and wetting/drying cycles.

4.5 CONCRETE SLABS SUPPORTED ON-GRADE

Following the recommendations for site preparation, the site would be suitable for grade supported floor slabs. We recommend the following provisions for design and construction of the floor slab:

1. All material placed within the building footprint should meet the requirements of “non-expansive” select fill.

2. All utility trench backfill and foundation backfill should be placed in accordance with the requirements of structural fill.

3. A granular leveling course, having a minimum thickness of 4 inches, should be used below the building floor slab. The granular section provides a capillary moisture break and acts as a leveling course. The granular leveling course should consist of clean, crushed limestone gravel with a nominal size of ½ to ¾ inch.

4. Immediately prior to construction of the building floor slab, it is recommended that the exposed subgrade be evaluated to determine whether moisture contents are within the recommended range and to identify areas disturbed by construction operations. Unsuitable or disturbed areas should be reworked prior to placement of the granular leveling course and construction of the floor slab.

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4.6 PAVEMENTS

The pavement sections included in Table 4.6 are provided for consideration for use at the project site.

Table 4.6 – Typical Pavement Sections

Pavement Area	Minimum Portland Cement Concrete (PCC) Design Thickness, Inches
Standard Duty (Parking Areas Passenger Vehicles Only)	Portland Cement Concrete 5.0 PCC[1] 6.0 Aggregate Base[2] Geotextile Separator Fabric[3] 9.0 Recompacted Subgrade
Heavy Duty (Access Lanes Passenger Vehicles Only)	Portland Cement Concrete 6.0 PCC[1] 6.0 Aggregate Base[2] Geotextile Separator Fabric[3] 9.0 Recompacted Subgrade
Heavy Duty (Fire Truck Traffic)	Portland Cement Concrete 6.0 PCC[1] 6.0 Aggregate Base[2] Geotextile Separator Fabric[3] 9.0 Recompacted Subgrade

1 ODOT "Standard Specifications for Highway Construction" Section 701
2 ODOT "Standard Specifications for Highway Construction" Section 703.01, Type A.
3 AASHTO M288 Class 2 and Appendices A1 and A3.

1. Existing fill present within the proposed pavement areas should be evaluated through the use of proofrolling and test pits. Unsuitable materials encountered during the proofrolling and/or test pits should be undercut and be replace with controlled structural fill.

2. When encountered, the fill thickness within the borings ranged from 0.8 to 3 feet.

3. The moisture content and density of pavement subgrade should be checked within two days prior to paving operations.

4. The pavement subgrade should be proofrolled prior to paving operations.

5. Lower consistency soils exposed at the pavement subgrade elevation should be corrected as indicated in Section 4.2. If lower consistency/relative density soils extend to depths greater than 18 inches, we should be contacted to determine if modifications to the recommendations would be warranted.

4.7 EXCAVATIONS

All excavations and excavation retention systems are the sole responsibility of the Contractor and should be in accordance with Oklahoma State law, and design by a licensed professional engineer. Attention is drawn to OSHA Standards 29 CFR - 1926 Subpart P for guidance in the design of such systems.

5. ADDITIONAL SERVICES

5.1 PLANS AND SPECIFICATIONS REVIEW

We recommend that GFAC Engineering Inc. conduct a general review of the final plans and specifications to evaluate that our earthwork and foundation recommendations have been properly interpreted and implemented during design. In the event GFAC Engineering Inc. is not retained to perform this recommended review, we will assume no responsibility for misinterpretation of our recommendations.

5.2 CONSTRUCTION OBSERVATION AND TESTING

We recommend that all earthwork during construction be monitored by a representative of GFAC Engineering Inc. These observations should include site preparation, placement of all engineered fill and trench backfill, construction of slab subgrades, and all foundation excavations. The purpose of these services would be to provide GFAC Engineering Inc. the opportunity to observe the soil conditions encountered during construction, evaluate the applicability of the recommendations presented in this report to the soil conditions encountered, and recommend appropriate changes in design or construction procedures if conditions differ from those described herein.

The following section outlines geotechnical engineering and construction testing services necessary to implement the recommendations presented in this report. The following services should be provided by a qualified testing firm:

1. An experienced engineering technician should observe the subgrade throughout the proposed construction areas immediately following stripping, grubbing, and undercutting to identify areas requiring additional undercutting and to evaluate the suitability of the exposed surface for fill placement.

2. An experienced engineering technician should monitor and test all fill placed within the building and pavement areas to determine

whether the type of material, moisture content and degree of compaction are within recommended limits.

3. An experienced engineering technician should observe the moisture conditioning and proofrolling of the subgrade prior to placement of structural fill to evaluate the suitability of the exposed surface for fill placement.

4. An experienced technician or engineer should observe and test all foundation excavations. Where unsuitable bearing conditions are observed, remedial procedures can be established in the field to avoid construction delays.

5. The condition of the subgrade should be evaluated immediately prior to construction of the building floor slab to determine whether the moisture content of subgrade soils and condition of soils are as recommended.

6. The condition of the pavement subgrade should be evaluated immediately prior to construction of the pavements to determine whether the moisture content of subgrade soils and condition of soils are as recommended. Proofrolling would aid in evaluation of the pavement subgrade soils.

6. LIMITATIONS

Recommendations contained in this report are based on our field observations and subsurface explorations, limited laboratory tests, and our present knowledge of the proposed construction. It is possible that subsurface conditions could vary between or beyond the points explored. If subsurface conditions are encountered during construction that differ from those described herein, we should be notified immediately in order that a review may be made and any supplemental recommendations provided. If the scope of the proposed construction, including the proposed loads or structural locations, changes from that described in this report, our recommendations should also be reviewed.

We have prepared this report in substantial accordance with the generally accepted geotechnical engineering practice as it exists in the site area at the time of our study. No warranty is expressed or implied. The recommendations provided in this report are based on the assumption that an adequate program of tests and observations will be conducted by GFAC Engineering Inc. during the construction phase in order to evaluate compliance with our recommendations. The scope of our services did not include any environmental assessment or exploration for the presence of hazardous or toxic materials in the soil, surface water, groundwater or air, on, below or around this site.

This report may be used only by owner and only for the purposes stated, within a reasonable time from its issuance, but in no event later than three years from the date of report. Land use, site conditions (both on-site and off-site), regulations, or other factors may change over time, and additional work may be required with the passage of time. Any party other than the client who wishes to use this report shall notify GFAC Engineering Inc. of such intended use. Based on the intended use of the report, GFAC Engineering Inc. may require that additional work be performed and that an updated report be issued. Non-compliance with any of these requirements by the client or anyone else will release GFAC Engineering Inc. from any liability resulting from the use of this report by any unauthorized party and client agrees to defend, indemnify and hold harmless GFAC Engineering Inc. from any claim or liability associated with such unauthorized or non-compliance.

APPENDIX A

FIELD EXPLORATION PROGRAM
PLATE 1 – SITE LOCATION MAP
PLATE 2 – BORING LOCATION DIAGRAM
SUBSURFACE DIAGRAM
BORING LOGS

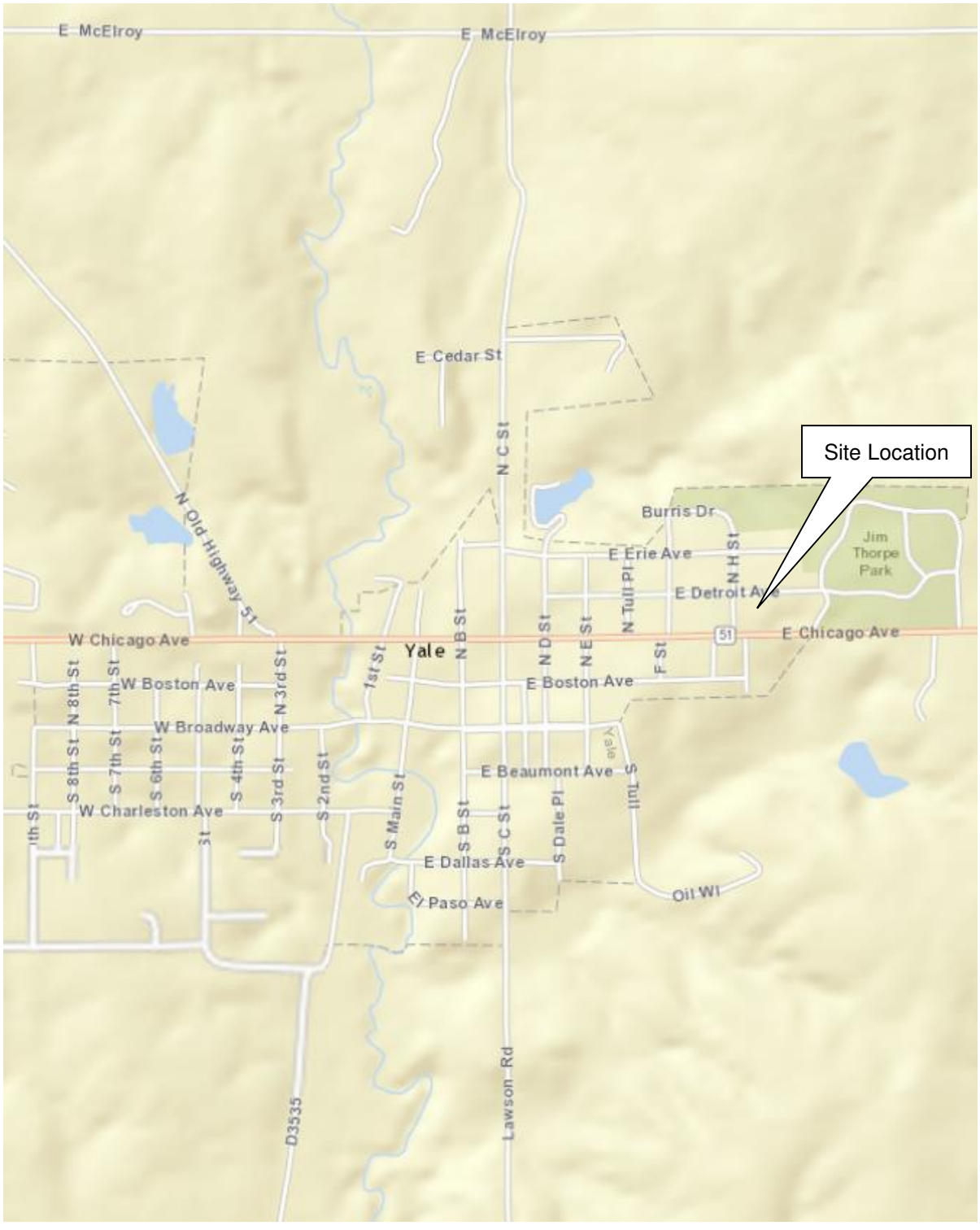
FIELD EXPLORATION PROGRAM

The fieldwork for this study was performed on June 1, 2017. The exploration consisted of a total of five (5) borings. Borings B-1, B-2, and B-3 were performed in/within the vicinity of the proposed building footprint and Borings P-1 and P-2 were performed in the vicinity of the proposed pavement areas. The borings were extended to approximate depths ranging from 5 to 9.3 feet below the existing ground surface levels. Representatives of GFAC established the boring locations in the field. Distances were measured with a measuring wheel. Right angles were estimated. Elevations at the boring locations were determined through use of an engineer's level and were referenced to Control Point 60.001 set near the southwest corner of the site by Bennett Surveying. An elevation of 100.0 feet was assumed for the temporary benchmark. Locations and elevations of the borings should be considered accurate only to the degree implied by the methods used to obtain them.

The drilling operations were performed by GFAC Engineering Inc. The borings were drilled using a truck-mounted (CME 55), rotary drill using solid stem augers to advance the borings. Representative samples were obtained using the split-barrel sampling procedures in general accordance with ASTM D 1586. The split-barrel sampling procedure utilizes a standard 2-inch O.D. split-barrel sampler that is driven into the bottom of the boring with a 140-pound auto-hammer falling a distance of 30 inches. The number of blows required to advance the sampler the last 12 inches of a normal 18 inch penetration is recorded as the Standard Penetration Resistance Value (N). These "N" values are indicated on the boring logs at their depth of occurrence and provide an indication of the consistency and hardness of the material.

Boring logs included in this appendix, present such data as soil and bedrock descriptions, depths, sampling intervals and observed groundwater conditions. Conditions encountered in each of the borings were monitored and recorded by the field engineer. Field logs included visual classification of the materials encountered during drilling, as well as drilling characteristics. Our final boring logs represent the engineer's

interpretation of the field logs combined with laboratory observation and testing of the samples. Stratification boundaries indicated on the boring logs were based on observations during our fieldwork, an extrapolation of information obtained by examining samples from the borings and comparisons of soils with similar engineering characteristics. Locations of these boundaries are approximate, and the transitions between soil and bedrock types may be gradual rather than clearly defined.



Source : ESRI

Not to Scale

Site Vicinity Map

Proposed Yale Fire Station
SEC of N. "H" Street and E. Detroit Avenue
Yale, Oklahoma
Project G2017040 May 11, 2017

Plate 1

GFAC ENGINEERING

Not to Scale

Boring locations are approximate.

Boring Location Diagram
Proposed Yale Fire Station
SEC of N. "H" Street and E. Detroit Avenue
Yale, Oklahoma
Project G2017040 June 5, 2017

Plate 2

GFAC Engineering Inc
PO Box 472201
Tulsa OK 74147
Telephone: 918-622-7021

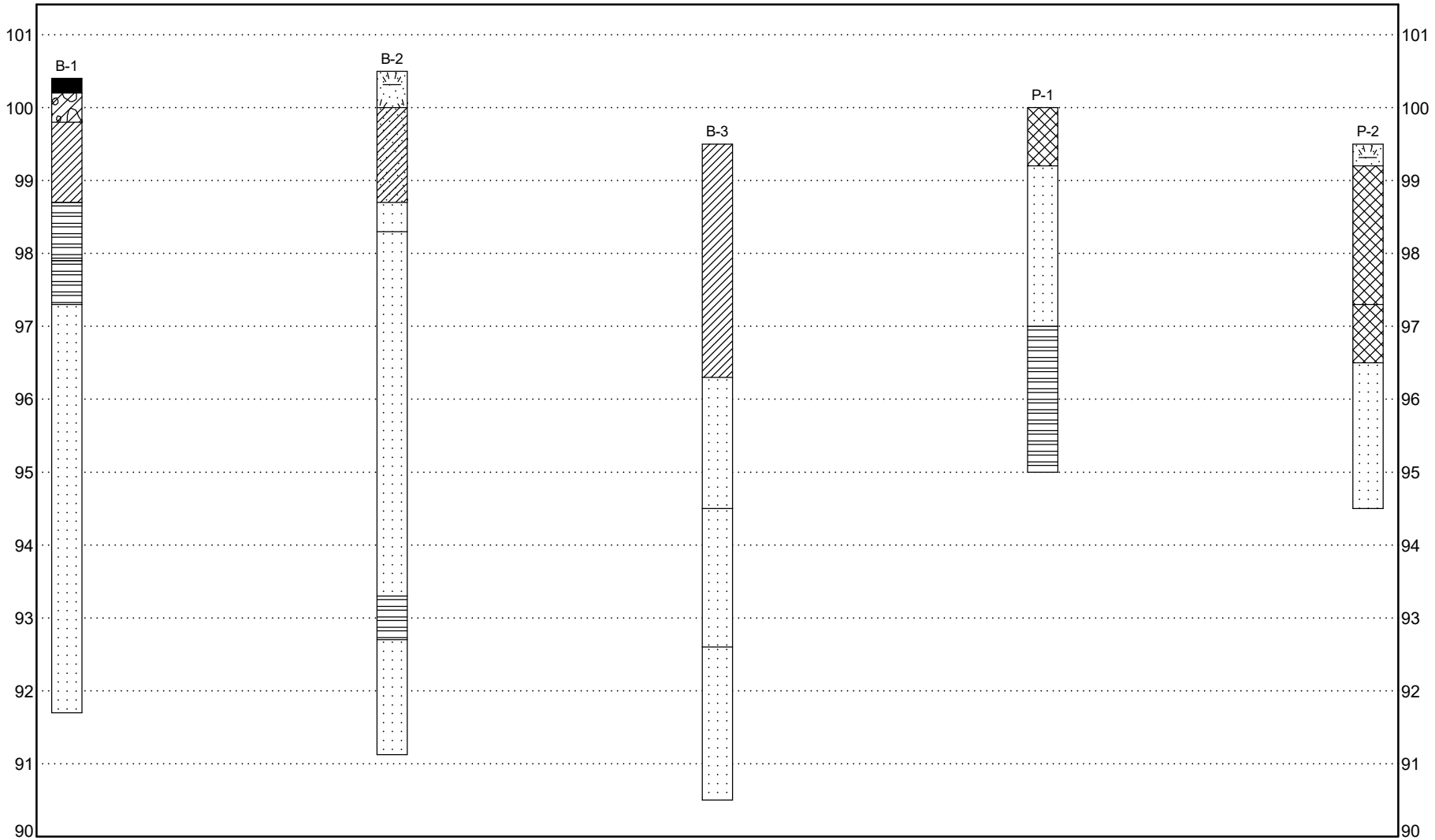
SUBSURFACE DIAGRAM

CLIENT JC Engineering, PC

PROJECT NUMBER G2017040

PROJECT NAME Proposed Yale Fire Station

PROJECT LOCATION SEC of "H" Street and Detroit Avenue, Yale, OK



GFAC Engineering Inc
PO Box 472201
Tulsa OK 74147
Telephone: 918-622-7021

BORING NUMBER B-1

CLIENT JC Engineering, PC
PROJECT NAME Proposed Yale Fire Station
PROJECT NUMBER G2017040
PROJECT LOCATION SEC of "H" Street and Detroit Avenue, Yale, OK
DATE STARTED 6/2/17 **COMPLETED** 6/2/17
GROUND ELEVATION 100.4 ft **HOLE SIZE** 6 inches
DRILLING CONTRACTOR GFAC Engineering
GROUND WATER LEVELS:
DRILLING METHOD Continuous Flight Auger 6"
AT TIME OF DRILLING --- Dry
LOGGED BY DLK **CHECKED BY** BKM
AT END OF DRILLING --- Dry
NOTES
AFTER DRILLING ---

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	Texas Cone Penetrometer	BLOW COUNTS (N VALUE)	Uncon. Strength (psf)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	ATTERBERG LIMITS: LIQUID LIMIT	ATTERBERG LIMITS: PLASTIC LIMIT	ATTERBERG LIMITS: PLASTICITY INDEX	FINES CONTENT (%)
0.0		ASPHALT - 2 inches											
		CLAYEY GRAVEL, brown - 5 inches											
		LEAN CLAY with sand, sandstone gravel, and shale fragments, moist, stiff, tan, yellow	SS 1	67		4-6-10 (16)			13	30	18	12	83
		HIGHLY WEATHERED SANDY SHALE, very soft, tan, yellow											
2.5		SANDY SHALE, very soft, tan, yellow	SS 2	100		50/ 5"							
		SANDSTONE with shale seams, cemented, tan, yellow											
5.0			SS 3	80		50/ 2.5"							
7.5													
			SS 4	80		50/ 2.5"							
		Bottom of borehole at 8.7 feet.											

GFAC Engineering Inc
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Tulsa OK 74147
Telephone: 918-622-7021

BORING NUMBER B-2

CLIENT JC Engineering, PC
PROJECT NAME Proposed Yale Fire Station
PROJECT NUMBER G2017040
PROJECT LOCATION SEC of "H" Street and Detroit Avenue, Yale, OK
DATE STARTED 6/2/17 **COMPLETED** 6/2/17
GROUND ELEVATION 100.5 ft **HOLE SIZE** 6 inches
DRILLING CONTRACTOR GFAC Engineering
GROUND WATER LEVELS:
DRILLING METHOD Continuous Flight Auger 6"
AT TIME OF DRILLING --- Dry
LOGGED BY DLK **CHECKED BY** BKM
AT END OF DRILLING --- Dry
NOTES
AFTER DRILLING ---

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	Texas Cone Penetrometer	BLOW COUNTS (N VALUE)	Uncon. Strength (psf)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	ATTERBERG LIMITS: LIQUID LIMIT	ATTERBERG LIMITS: PLASTIC LIMIT	ATTERBERG LIMITS: PLASTICITY INDEX	FINES CONTENT (%)
0.0		TOPSOIL AND 3/8" LIMESTONE GRAVEL											
		SANDY LEAN CLAY, moist, medium stiff to stiff, brown, tan, yellow	SS 1	89		4-3-12 (15)							
		WEATHERED SANDSTONE, poorly cemented, tan, yellow											
2.5		SANDSTONE with shale seams, cemented, tan, yellow	SS 2	80		50/ 2.5"							
5.0			SS 3	86		50/ 3.5"							
7.5		SHALE, very soft, tan, olive											
		SANDSTONE with weathered shale seams, cemented, tan, yellow	SS 4	86		26-50/ 4.5"							

Bottom of borehole at 9.4 feet.

GFAC Engineering Inc
PO Box 472201
Tulsa OK 74147
Telephone: 918-622-7021

BORING NUMBER B-3

CLIENT JC Engineering, PC
PROJECT NAME Proposed Yale Fire Station
PROJECT NUMBER G2017040
PROJECT LOCATION SEC of "H" Street and Detroit Avenue, Yale, OK
DATE STARTED 6/2/17 **COMPLETED** 6/2/17
GROUND ELEVATION 99.5 ft **HOLE SIZE** 6 inches
DRILLING CONTRACTOR GFAC Engineering
GROUND WATER LEVELS:
DRILLING METHOD Continuous Flight Auger 6"
AT TIME OF DRILLING --- Dry
LOGGED BY DLK **CHECKED BY** BKM
AT END OF DRILLING --- Dry
NOTES
AFTER DRILLING ---

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	Texas Cone Penetrometer	BLOW COUNTS (N VALUE)	Uncon. Strength (psf)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	ATTERBERG LIMITS: LIQUID LIMIT	ATTERBERG LIMITS: PLASTIC LIMIT	ATTERBERG LIMITS: PLASTICITY INDEX	FINES CONTENT (%)
0.0		LEAN CLAY with sand, moist, medium stiff, tan, brown	SS 1	33		2-2-2 (4)			15	36	18	18	72
2.5		HIGHLY WEATHERED SANDSTONE, poorly cemented, tan, orange	SS 2	67		2-9-11 (20)							
5.0		WEATHERED SANDSTONE, poorly cemented, tan, trace gray	SS 3	100		24-29-44 (73)							
7.5		SANDSTONE, poorly cemented to cemented, tan	SS 4	100		50/ 6"							

Bottom of borehole at 9.0 feet.

GFAC Engineering Inc
PO Box 472201
Tulsa OK 74147
Telephone: 918-622-7021

BORING NUMBER P-1

CLIENT JC Engineering, PC
PROJECT NAME Proposed Yale Fire Station
PROJECT NUMBER G2017040
PROJECT LOCATION SEC of "H" Street and Detroit Avenue, Yale, OK
DATE STARTED 6/2/17 **COMPLETED** 6/2/17
GROUND ELEVATION 100 ft **HOLE SIZE** 6 inches
DRILLING CONTRACTOR GFAC Engineering
GROUND WATER LEVELS:
DRILLING METHOD Continuous Flight Auger 6"
AT TIME OF DRILLING --- Dry
LOGGED BY DLK **CHECKED BY** BKM
AT END OF DRILLING --- Dry
NOTES
AFTER DRILLING ---

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	Texas Cone Penetrometer	BLOW COUNTS (N VALUE)	Uncon. Strength (psf)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	ATTERBERG LIMITS: LIQUID LIMIT	ATTERBERG LIMITS: PLASTIC LIMIT	ATTERBERG LIMITS: PLASTICITY INDEX	FINES CONTENT (%)
0.0		POSSIBLE FILL- Sandy Lean Clay, moist, medium stiff, tan and brown											
		HIGHLY WEATHERED SANDSTONE with shale seams, poorly cemented, moist, tan	SS 1	100		8-18-21 (39)			10	27	16	11	59
2.5		WEATHERED SHALE, very soft, tan, brown, olive, gray											
			SS 2	100		14-24-36 (60)							
5.0		Bottom of borehole at 5.0 feet.											

GFAC Engineering Inc
PO Box 472201
Tulsa OK 74147
Telephone: 918-622-7021

BORING NUMBER P-2

CLIENT JC Engineering, PC
PROJECT NAME Proposed Yale Fire Station
PROJECT NUMBER G2017040
PROJECT LOCATION SEC of "H" Street and Detroit Avenue, Yale, OK
DATE STARTED 6/2/17 **COMPLETED** 6/2/17
GROUND ELEVATION 99.5 ft **HOLE SIZE** 6 inches
DRILLING CONTRACTOR GFAC Engineering
GROUND WATER LEVELS:
DRILLING METHOD Continuous Flight Auger 6"
AT TIME OF DRILLING --- Dry
LOGGED BY DLK **CHECKED BY** BKM
AT END OF DRILLING --- Dry
NOTES
AFTER DRILLING ---

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	Texas Cone Penetrometer	BLOW COUNTS (N VALUE)	Uncon. Strength (psf)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	ATTERBERG LIMITS: LIQUID LIMIT	ATTERBERG LIMITS: PLASTIC LIMIT	ATTERBERG LIMITS: PLASTICITY INDEX	FINES CONTENT (%)
0.0		TOPSOIL											
		FILL- Sandy Lean Clay, moist, brown, tan	SS 1	22		2-2-2 (4)			14	29	17	12	65
2.5		POSSIBLE FILL- Sandstone Boulders, well cemented, tan, brown											
		HIGHLY WEATHERED SANDSTONE, poorly cemented, tan	SS 2	100		5-6-12 (18)							
5.0		Bottom of borehole at 5.0 feet.											

APPENDIX B

LABORATORY TESTING PROGRAM

LABORATORY TESTING PROGRAM

GENERAL

Laboratory tests were performed on select, representative samples to evaluate pertinent engineering properties of these materials. We directed our laboratory testing program primarily toward classifying the subsurface materials, and measuring index values of the on-site materials. Laboratory tests were performed in general accordance with applicable standards, and the results are presented on the respective boring logs. The laboratory testing program consisted of the following:

- **Moisture content tests** ASTM D 2216, Standard Test Method for Laboratory Determination of Water (Moisture) Content of Soil and Rock by Mass
- **Atterberg limits tests** ASTM D 4318, Standard Test Methods for Liquid Limit, Plastic Limit, and Plasticity Index of Soils
- **Visual classification** ASTM D 2488, Standard Practice for Description and Identification of Soils (Visual-Manual Procedure)

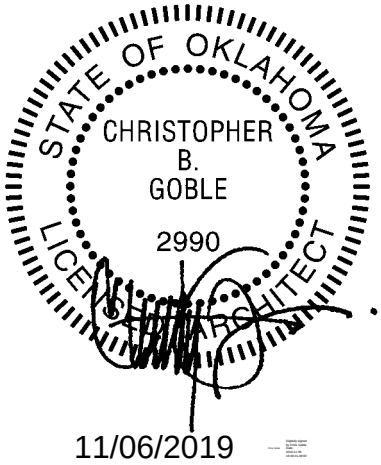
CLASSIFICATION

All samples were examined in field by a geotechnical engineer using visual and manual procedures. The samples were classified in general accordance with the Unified Soil Classification System, and are shown on the boring logs.

Bedrock units encountered in the borings were described based on visual classification of disturbed auger cuttings and recovered samples, as well as drilling characteristics. Core samples may reveal other rock types.

Yale Fire Department
Fire Station No. 1
801 North Chicago Avenue
Yale, Oklahoma 74085

ADDENDUM #01



SGA Project No.:	**1533201**
Project Name:	Yale Fire Department - Fire Station No. 1
Project Location:	801 North Chicago Avenue Yale, Oklahoma 74085
Addendum Date:	11-6-2019

The scope of this Addendum is to revise the originally issued contract documents of the above listed project. These revisions are to be referenced and identified in the bids provided. All subsequent contract modifications are to reflect the following:

A. PRE-BID MEETING QUESTIONS & ANSWERS

The following are questions and the respective follow-up answers discussed at the Pre-Bid meeting held at the office of the Payne County Clerk on 10/31/19.

1. Who is responsible for the cost of the building permit?
    a. Answer: The building permit will be applied and paid for by the Owner. The permit will be reviewed and issued by the City of Yale.
2. Is the project tax exempt?
    a. Answer: Yes. The Payne County Clerk will provide to the successful low bidder a letter of designated agent of Payne County.
3. What traffic controls are to be utilized for the construction of the Highway 51 entry drive?
    a. Answer: Comply with all ODOT safety requirements as specified in Section 01400.1.02.3 Safety, and Section 01500.1.11.1.
4. Is the temporary site fence required?
    a. Answer: The temporary site fence requirement is deleted. Section 01500.1.15 is revised per C.6 below.
5. What are the subsurface soil conditions?
    a. Answer: Added below per C.4, Specification Section 00313 - Geotechnical Data and Geotechnical Investigation Report, dated 6/27/17.
6. Who is responsible for the foundation system design?
    a. Answer: Building foundations will be provided by the contractor in coordination with metal building contractor/designer. Refer to Section 03300 – Concrete, paragraph 1.4 Contractor Design and Build Engineered Systems.
7. What size pipe bollards are required? Drawings indicate 8 inch painted bollards, the specifications call for 6 inch plastic sleeves
    a. Answer: Bollards are as indicated on First Floor Plan 1-A1.1. Revise specification Section 05500 Metal Fabrications per C.7 below to delete galvanizing and plastic sleeves.

8. What type of roof panel system is to be provided? Specifications require warranty for raised seam roof panel weathertightness and product specified is 26 gauge MBCI PBR screw-down type.
    a. Answer: Specification Section 13419 is revised per item C.8 below.
9. Gable end ridge vents are not specified as to type or whether dampers are to be provided.
    a. Answer: Architectural Drawings are revised per item B.1 below. Refer also to HVAC Narrative for louver requirements.
10. Insulation specified has high R-value and installation system has a premium cost. Is this correct?
    a. Answer: Specification Section 13419 is revised per item C.8 below.
11. Are liner panels to be used at the Restroom 102 & Laundry 101 Apparatus Bay side walls?
    a. Answer: Detail 1-A-3.1 indicates liner panels at the walls in question.

B. CHANGES TO THE DRAWINGS

1. REVISE Detail 2-A2.1 East Elevation and Detail 3-A2.1 West Elevation gable end louvers to be 42”x42” fixed 4” extruded aluminum stationary drainable louvers as specified in HVAC Narrative paragraph 6.4.3. provide insect screens. Finish: Standard baked enamel color to match PSF-3, submit for selection by Architect. Coordinate installation with exhaust fan EF1 specified in HVAC Narrative paragraph 6.4.2.

C. CHANGES TO THE SPECIFICATIONS

1. REISSUE Section 00001 – Seals Page, for this change.
2. REVISE Section 00003 - Table of Contents, as attached.
    a. ADD Section 00310 – Bid Form
    b. ADD Section 00313 -Geotechnical Data
3. ADD Section 00310 – Bid Form, as attached.
4. ADD Section 00313 – Geotechnical Data and Geotechnical Investigation Report, dated 6/27/2017, attached.
5. REVISE Section 01230 – Alternates, add subparagraph D. Alternate No. 04 as follows:

    Alternate No. 04: Metal Roof Panels
    1. Base Bid: 26 gauge MBCI PBR or equal. as specified in Section 13241, paragraph 2.3.B
    2. Alternate: 24 gauge 24” wide MBCI Ultra-Dek or equal as specified in Section 13241, paragraph 2.3.B
6. REVISE Section 01500 - Temporary Facilities, paragraph 1.15 to read as follows, deleting requirement for temporary site fence:
    a. “All tool and material security is the responsibility of the Contractor”.
7. REVISE Section 05500 – Metal Fabrications 3.4.F.2 to read as follows, delete subparagraph “c” bollard plastic sleeves:
    a. “Interior: Prime paint finish, as indicated in Section 09900.”
    b. “Exterior: Prime paint finish, as indicated in Section 09900.”
8. REVISE Section 13419 - Metal Building Systems, as follows:
    a. DELETE paragraph 1.11.B Special Weathertightness Warranty
    b. REVISE paragraph 2.3.B as follows:
        B. Roof Panels:
            1. 26 gauge MBCI PBR or equal. Color as indicated. (Base Bid)
            2. 24 gauge 24” wide MBCI Ultra-Dek or equal. Color as indicated. (Alternate #4)
    c. REVISE paragraph 2.4 as follows:

        2.4 THERMAL INSULATION

        A. Faced Metal Building Insulation: ASTM C991, Type II, glass-fiber-blanket insulation; 0.5-lb/cu. ft. (8-kg/cu. m) density; 2-inch- (51-mm-) wide, continuous, vapor-tight edge tabs; with a flame-spread index of 25 or less and thickness as follows:
            1. Roof: R-19: with R-5 rigid insulation thermal blocks in accordance with the 2006 International Energy Code table 502.2(2).
            2. Walls: R-13

B. Vapor-Retarder Facing: ASTM C1136, with permeance not greater than 0.02 perm when tested according to ASTM E96/E96M, Desiccant Method.
   1. Composition: White polypropylene film facing, fiberglass scrim reinforcement, and metallized-polyester film backing.
C. Vapor-Retarder Tape: Pressure-sensitive tape of type recommended by vapor-retarder manufacturer for sealing joints and penetrations in vapor retarder.

END OF ADDENDUM